Space Weather Forecast

Issued on Tuesday, 05 December 2023 at 13:21 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight chance of a G1/Minor Geomagnetic Storm early Day 1 but risk reducing as solar winds ease into the next few days. Chance of isolated M-Class flares (R1-R2 Blackouts) throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is currently Moderate with the largest flare of the past 24 hours a Moderate flare at 05/0639 UTC from what looks to be the small recently numbered region rounding the northeast limb. There are currently 9 sunspot regions on the disc, 7 of which are numbered with two in the far southwest no longer visible having rotated beyond the western limb. The two main complex regions on the disc are close to centre disc in the south. Both regions have seen continued slow intermediate growth but with some consolidation around the main spots. The remaining regions on the visible disc appear small and stable or in slow decay.

Despite a number of coronal mass ejection signatures evidenced in coronagraph imagery during the past 24 hours, none are considered Earth-directed. However, a filament eruption from near one of the south-eastern spots around 04/07000 UTC produced a CME that may give a glancing blow on Day 3 (07 Dec).

Solar Wind / Geomagnetic Activity: Solar wind speeds have been at elevated levels throughout, varying between 520-560 km/s. The Interplanetary Magnetic Field (IMF), Bt, was initially weak before rising to moderate levels. Since around 04/1540 UTC IMF increased more steeply and peaked at 15nT at around 05/0200 UTC before reducing back down to weak to moderate levels by the end of the period. The north-south component of the IMF (Bz), was largely positive initially, more variable through the second half of the period but only weakly fluctuating. Resultant Geomagnetic activity was Quiet to Active (Kp 1-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at Background levels with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low to Moderate with a chance for isolated Moderate flares (R1-R2 Blackouts) throughout.

Solar Winds / Geomagnetic Activity: A CME that left the Sun around 04/0700 UTC is expected to miss, but there is a slight chance of a glancing blow on Day 3 (07 Dec). No further CMEs are currently thought to be Earth-directed.

Enhancement of solar winds from a coronal hole fast stream is expected to persist through Days 1-2 (05-06 Dec) with winds at Elevated levels, possibly peaking around 600-620km/s Day 1. Winds are expected to slowly return to Slightly Elevated levels on Days 3-4 (07-08 Dec). Geomagnetic activity is expected to be largely Quiet to Unsettled through the forecast period (Kp

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1-3). There is a chance during Day 1 (05 Dec) that influences from the HSS may see activity increase to Active (Kp 4) and a slight chance of G1/Minor Geomagnetic Storm (Kp 5) levels. This risk reducing into the period as solar winds ease. There is a slight chance on Day 3 (07 Dec) that a glancing blow from a CME produce an Active or G1/Minor Geomagnetic Storm interval, but this is considered a low probability.

Auroral activity may become slightly enhanced overnight Day 1 into Day 2 (05-06 Dec) due to the faster solar winds currently being seen. From the UK views of aurora may be possible across parts of northern Scotland and perhaps Northern Ireland Tuesday night, with activity waning into the forecast period.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain at background levels with no Solar Radiation Storms expected.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	5	5	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	35	35	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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